

REMARKS

Claims 1-10, 12-35, and 37-47 are pending, with claims 1, 18, and 30 being independent and claims 16-29 being withdrawn. Claims 1, 3-5, 10, 30-34, and 38 have been amended. Support for the amendments can be found in the originally-filed specification, at least at page 2, line 13 to page 3, line 6; page 4, lines 11-31 and Figs. 1 and 2. No new matter has been introduced.

Claims 1-10, 12-15, 30-35, and 37-47 have been rejected as being unpatentable over Applicant's Admitted Prior Art (the admitted prior art) in view of U.S. Patent No. 4,504,727 (Melcher) and U.S. Patent No. 6,873,414 (Schuth). Applicant requests withdrawal of this rejection because neither the admitted prior art, Melcher, Schuth, nor any proper combination of the three describes or suggests diagnostic radiation that is decoupled from laser radiation produced by a laser and from laser radiation that is directed to a workpiece, where the diagnostic radiation is directed to a measuring cell, and a measuring cell that contains a portion of one or more operating gases, as recited in independent claim 1, and as similarly recited in independent claim 30.

The admitted prior art mentions that in a laser-processing machine including a CO₂ laser, CO₂ laser radiation can be guided through a gas atmosphere and that the CO₂ laser radiation can be absorbed by molecules. See the Specification at page 1, line 9 to page 2, line 11. However, the admitted prior art never describes or suggests decoupling diagnostic radiation from such laser radiation, and a measuring cell that contains a portion of operating gases to be analyzed and that receives the decoupled diagnostic radiation.

Realizing these deficiencies, the Office points to Melcher, and merely states that Melcher describe "use of photo acoustic signals which are monitored with a sensor or microphone in order to monitor gas." In Melcher, laser radiation 18 from a laser system 10 is directed to a workpiece 60, and a beam splitter 57 splits the laser radiation into a portion that is directed to the workpiece 60 and a portion 19 that is directed to a sensor 52. See Melcher at col. 3, line 44 to col. 4, line 2 and the Figure. However, the portion 19 that is decoupled from the radiation that is directed to the workpiece 60 is not also directed to a measuring cell. Rather, the portion 19 is

merely directed to a sensor 52, which is not a measuring cell and does not include any operating gases to be analyzed. Indeed, Melcher totally lacks a measuring cell or any suggestion that the recited operating gases are analyzed. And, the portion of the laser radiation that is directed to the workpiece 60 is not decoupled from the laser radiation and it does not pass through a measuring cell.

The Office also points to Fig. 1 of Schuth, and merely states that Schuth shows a "measuring apparatus for obtaining a photo-acoustic signal including laser, mirror, and microphone." Fig. 1 of Schuth shows a reactor 40 having a cuvette 41 that houses an effluent and receives a laser beam 11 from a laser source 10. See Schuth at col. 13, lines 18-61 and Fig. 1. A microphone 30 is placed at the side of the cuvette 41 to detect photoacoustic signals. See Schuth at col. 11, line 46 to col. 12, line 25 and Fig. 1. However, Schuth never describes or suggests that the laser beam 11 that is directed into the cuvette 41 is decoupled from laser radiation that is directed to a workpiece or that the cuvette 41 contains the recited operating gases to be analyzed.

Nevertheless, the Office maintains that the claimed apparatus would have been obvious "because measurement and feedback are well known, photo acoustic monitoring is well known in laser processing machines, and the measurement device arrangement decoupled from the laser path are known and because providing monitoring separated from the weld spot provides good apparatus arrangement for sustained operation." However, even if the admitted prior art were to be modified by Melcher and Schuth, which applicant does not concede is proper, the modification of the prior art would still fail to describe or suggest that laser radiation decoupled from laser radiation directed to a workpiece is also directed through a measuring cell that houses operating gases.

Moreover, if the Office is suggesting that Schuth's cuvette 41 be placed in the path of the portion 19 that is decoupled from the portion directed to the workpiece 60 in Melcher, then applicant submits that one of skill in the art would not be led to make such a modification of Melcher for the following reasons. First, Melcher's system relates to monitoring of gases at the workpiece 60 and not at remote locations. Melcher explains that the sensor 59 "is in proximity

to the selected site 62" to receive "the photoacoustic signals which are generated as a result of the drilling process at selected site 62." See Melcher at col. 3, lines 54-60. Second, modification of Melcher to place a cuvette 41 in the path of the portion 19 would not only require a substantial redesign of Melcher's apparatus but would change the principle of operation of Melcher. In Melcher, the portion 19 is directed to the sensor 52, which produces a signal a for processing by an amplifier 22. See Melcher at col. 3, line 54 to col. 3, line 34 and Fig. 1. Indeed, Melcher explains that his invention uses two types of information, and the first type of information is provided by signal a on line 54, which is produced by the sensor 52 placed at the portion 19, and the information on signal a relates to the characteristics of the laser pulse. See Melcher at col. 4, lines 22-34. If one were to place the cuvette 41 at portion 19, Melcher would not be able to obtain the first type of information. Third, there is no suggestion in cited references for making such a change; it appears that the motivation suggested by the Office has been gleaned from applicant's own disclosure, which explains the numerous benefits of monitoring decoupled laser radiation to provide for real time analysis of the operating gases. See the specification at page 4, line 26 to page 5, line 10.

For at least these reasons, claims 1 and 30 are allowable over any proper combination of the admitted prior art, Melcher, and Schuth.

Claims 1-10, 12-15, 30-35, and 37-47 have been rejected as being unpatentable over the admitted prior art in view of U.S. Patent No. 4,543,486 (Rose) in view of Schuth. Applicant requests withdrawal of this rejection because neither the admitted prior art, Rose, Schuth, nor any proper combination of the three describes or suggests diagnostic radiation that is decoupled from laser radiation produced by a laser and from laser radiation that is directed to a workpiece, where the diagnostic radiation is directed to a measuring cell, and a measuring cell that contains a portion of one or more operating gases, as recited in independent claim 1, and as similarly recited in independent claim 30. As discussed above, the admitted prior art and Schuth are deficient in providing these features.

Rose does not remedy the failure of the admitted prior art and Schuth to describe or suggest this subject matter. In Rose, a laser beam 14' is directed onto a workpiece 16' and it

passes through a cell 30, 32 placed above the workpiece 16'. See Rose at col. 5, line 61 to col. 6, line 47 and Fig. 2. Rose never describes or suggests that radiation is decoupled from the laser beam 14' that is directed onto the workpiece 16' and the cell 30, 32 is not placed in the path of decoupled radiation. Rather, in Rose, the laser beam 14' is directed to the workpiece 16' by passing through a lens 22'. Moreover, it would not have been obvious to move the cell 30, 32 or to decouple laser radiation from the beam 14' because such a modification of Rose would change the principle of operation of Rose, which requires that the cell be placed upon a coated surface of the workpiece 16'. See Rose at col. 6, lines 11-18 and 48-50. If one were to place the cell 30, 32 instead in a path of decoupled radiation in Rose's system, then Rose's system would not operate as intended, which is to provide for detection of progress at the workpiece. See Rose at col. 6, lines 48-65.

Accordingly, claims 1 and 30 are allowable over any proper combination of the admitted prior art, Rose, and Schuth.

Claims 2-10, 12-15, 31-35, and 37-47 depend from claim 1 or 30, and are allowable for at least the reasons that claims 1 and 30 are allowable, and for containing allowable subject matter in their own right. For example, claims 9 and 35 generally recite that the machine includes a control unit for using a rinsing gas in response to the photo-acoustical effect measured. None of the cited references describes or suggests such a control unit. As a further example, claim 10 recites that the control unit is formed for controlling the flow rate of one or more supply gases of the laser-processing machine and of working or cutting gases in response to the analysis of a gas atmosphere in feed lines or in a laser beam path. None of the cited references describes or suggests such control. As another example, claim 43 recites that the operating gas to be analyzed is a laser operating gas. None of the cited references describes or suggests that a laser operating gas be analyzed. As another example, claim 38 recites that the laser-processing machine also includes a means for directing the portion of the laser-processing machine gas in the cell to flow back to the laser after it has been analyzed. None of the references describes or suggests such a directing means.

Applicant respectfully requests clarification regarding the status of the dependent claims, which do not appear to have been addressed by the Office. The Office indicates that applicant has failed to argue the limitations of the dependent claims. However, applicant has consistently argued that the dependent claims are allowable on their own merit. Indeed, applicant believes that these many of these claims recite allowable subject matter, as evidenced by the above remarks and remarks presented in previous replies.

In conclusion, applicant submits that all claims are in condition for allowance. The fee of \$120.00 for the Petition for One Month Extension of Time to and including August 15, 2008 is being paid concurrently with the Electronic Filing System (EFS). Please apply all charges or credits to deposit account 06-1050, referencing Attorney Docket No. 15540-0009001.

Respectfully submitted,

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/Diana DiBerardino/

Diana DiBerardino
Reg. No. 45,653

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331